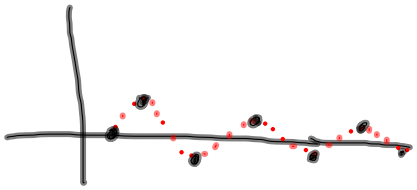
8.1 Sequences

function - domain = $\{1, 2, 3, 4, \ldots\}$

the graph is a set of dots

$$a_n = \frac{(-1)^n}{n^2+1}$$



$$\lim_{n\to\infty} \frac{(-1)^n}{n^2+1} = 0$$

seq. converges to 0

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arithmetic sequences (common diff)

ex: $\{-5, -2, 1, 4, 7, \ldots\}$ (linear)

$+3$ $+3$ $+3$

a a_2 a_3 a_4

$a_n = a + (n-1)d$ n^{th} term formula

$a_1 = a = -5$

$a_2 = -5 + (2-1)3 = -2$

$a_3 = -5 + (3-1)3 = 1$

$a_4 = -5 + (4-1)3 = 4$

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recursive formula

$a_n = a_{n-1} + d$, also need a_1, d

$a_1 = -5 \quad d = 3$

$a_2 = a_1 + d = -5 + 3 = -2$

$a_3 = a_2 + d = -2 + 3 = 1$

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geometric sequence - common ratio (multiply by r)

exponential

$\{1, 2, 4, 8, 16, \ldots\}$ (a) $\quad r = 2$

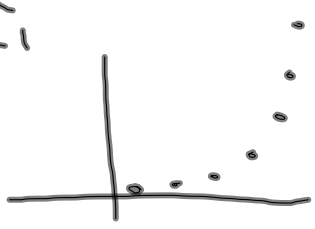
$a = 1$

n^{th} term formula

explicit

$a_n = a\, r^{n-1}$

recursive:



$a_n = a_{n-1} \cdot r$, need a_1

$a = a_1$

need r

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$n=3$

$\{1, -\frac{1}{2}, \frac{1}{4}, -\frac{1}{8}, \cdots\}$

write explicit & recursive def and graph

$a_n = \frac{(-1)^{n+1}}{2^{n-1}}$ $a_n = 1\left(-\frac{1}{2}\right)^{n-1}$

converges to 0

recursive

$a_n = a_{n-1}\left(-\frac{1}{2}\right)$ $a_1 = 1$

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$\lim_{n\to\infty} \frac{2n-1}{n} = 2$

$\lim_{x\to\infty} \frac{2x-1}{x} = 2$

l'hopital's rule

$\lim_{x\to\infty} \frac{2}{1}$

TAKE

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